

point greater than about 50°C and less than about 110°C and represented by the formula  $C_yH_{2y+1}COC_zH_{2z+1}$ , wherein y and z are 1 or greater and y+z is at most 5, and chlorocarbon extractive agents consisting of chlorocarbons having a normal boiling point greater than about 39°C and less than about 150°C and represented by the formula  $C_sH_{2s+2-t}Cl_t$ , wherein s is 1 or 2 and t is from 2 to 4 to form a second mixture,

separating difluoromethane (HFC-32) from at least one halocarbon of the second mixture by extractively distilling the second mixture, and

recovering difluoromethane (HFC-32) substantially free of at least one halocarbon, with the proviso that when the halocarbon is pentafluoroethane (HFC-125), the chlorocarbon extractive agent may not be methylene chloride and when the halocarbon is 1,1,1-trifluoroethane (HFC-143a), the extractive agent may not be an alcohol.

#### **REMARKS**

By the present amendment, claim 1 has been amended. The claims now pending are 1-11. A marked-up version of the rewritten claims is attached as a separate page to this amendment and is titled "Version With Markings to Show Changes Made". Reconsideration and favorable action are respectfully requested.

**RE: Examiner's statement in the March 27, 2001 office action "This application does not contain an abstract of the disclosure as required by 37 CFR 1.72(b). An abstract on a separate sheet is required."**

An abstract on a separate sheet is submitted herewith.

**RE: Examiner's statement in the March 27, 2001 office action "The compound "chlorodifluoromethane" in claim 1, line 3 is abbreviated as (CFC-12) which appears to be inconsistent with the specification..."**

The term "chlorodifluoromethane" in claim 1 has been amended to read dichlorodifluoromethane, consistent with the specification's teaching at: page 3, lines 24 and 29; page 5, table 1; page 8, table 5; page 10, line 13; page 11, lines 12 and 31; examples 1 and 2; as well as numerous other places in the specification.

The one other errant occurrence of the term "chlorodifluoromethane" in the specification has been amended to dichlorodifluoromethane (at page 2, line 22).

#### **Rejections under 35 U.S.C. 112**

**RE: "A) the "comprising" recited in the Markush grouping of claim 1, lines 10, 13 and 19 constitutes an improper Markush language"**

Claim 1 has been amended. The cited occurrences of the term "comprising" has been replaced with the term "consisting of".

**RE: "B) Claim 5 is at odds with claim 1, the claim from which it depends. "**

Claim 1 states "...with the proviso that when the halocarbon is pentafluoroethane (HFC-125), the chlorocarbon extractive agent may not be methylene chloride...". The limitation of claim 5 does not remove this proviso and is, therefore, not at odds with Claim 1.

**Rejections under 35 U.S.C. 102(e) and 35 U.S.C. 103(a)**

**RE: "Claims 1 and 4 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Mahler et al."**

Mahler et al. is US patent no. 5,830,325. Claim 1 has been amended to exclude the subject matter of Mahler. Mahler only describes alcohols as an extractant in the separation of HFC-143a from impurities. The instant invention is a different process from Mahler and uses extractants not disclosed in Mahler. Relative volatilities of the combination of HFC-32 with halocarbons is not predictable. Therefore, Mahler neither discloses nor suggests the instant invention.

**RE: "Claims 1 - 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mahler et al in view of EP '362."**

EP'362 discloses separation of pentafluoroethane from chloropentafluoroethane and does not disclose relative volatilities between HFC-32 and the present halocarbons in the presence of the claimed extractive agents. Relative volatilities of the combination of HFC-32 with halocarbons are not predictable and would be required for one of ordinary skill in the art to determine whether a specific extractant will perform a desired separation. Therefore, neither Mahler alone nor in combination with EP'362 suggest the instant invention.

**RE: "Claims 1 - 5 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Miller."**

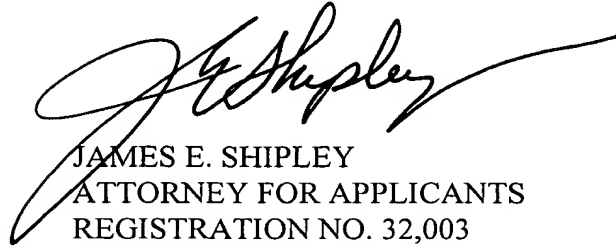
The instant claims exclude what is disclosed in Miller. In addition, the presently claimed invention is not obvious for the reasons already stated above for Mahler.

**In addition, Application Serial No. 09/485,559 and Patent No. 6,156,161 were, at the time the invention of Application Serial No. 09/485,559 was made, owned by the same E. I. DuPont de Nemours and Company, Inc.**

Therefore, Application Serial No. 09/485,559 is disqualified from being used in a rejection under 35 U.S.C. 103 against the instant claims.

In view of the foregoing, allowance of the above-referenced application is respectfully requested.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "J. E. Shipley", with a long, sweeping horizontal line extending to the right.

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9/27/01  
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## VERSION WITH MARKINGS TO SHOW CHANGES MADE

In showing the changes, deleted material is shown as bracketed (e.g. [bracketed]), and inserted material is shown as underlined (e.g. underlined).

### In the claims:

Claim 1 has been amended as follows:

1.(Amended) A process for separating difluoromethane (HFC-32) from at least one halocarbon of a first mixture comprising difluoromethane (HFC-32) and halocarbon selected from the group consisting of dichlorodifluoromethane (CFC-12), 1,1,1-trifluoroethane (HFC-143a), chloropentafluoroethane (CFC-115), and pentafluoroethane (HFC-125), comprising the steps of:

contacting the first mixture with an extractive agent selected from the group consisting of:

hydrocarbon extractive agents [comprising]consisting of hydrocarbons having from 5 to 9 carbon atoms and having a normal boiling point greater than about 30°C and less than about 155°C,

oxygen-containing extractive agents [comprising]consisting of alcohols having a normal boiling point greater than about 60°C and less than about 100°C and represented by the formula  $C_xH_{2x+1}OH$ , wherein x is from 1 to 3, and ketones having a normal boiling point greater than about 50°C and less than about 110°C and represented by the formula  $C_yH_{2y+1}COC_zH_{2z+1}$ , wherein y and z are 1 or greater and y+z is at most 5, and

chlorocarbon extractive agents [comprising]consisting of chlorocarbons having a normal boiling point greater than about 39°C and less than about 150°C and represented by the formula  $C_sH_{2s+2-t}Cl_t$ , wherein s is 1 or 2 and t is from 2 to 4 to form a second mixture,

separating difluoromethane (HFC-32) from at least one halocarbon of the second mixture by extractively distilling the second mixture, and

recovering difluoromethane (HFC-32) substantially free of at least one halocarbon, with the proviso that when the halocarbon is pentafluoroethane (HFC-125), the chlorocarbon extractive agent may not be methylene chloride and when the halocarbon is 1,1,1-trifluoroethane (HFC-143a), the extractive agent may not be an alcohol.